

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1-13 (Cancelled)

Claim 14 (Original): A bioferrograph for identifying magnetically susceptible particles, the bioferrograph comprising:

- (a) a silicon substrate having a topside and backside;
- (b) the topside comprising a sensor portion for sensing the presence of at least one magnetically susceptible particle; and
- (c) the backside comprising a magnetic portion having at least two pole pieces separated by a gap.

Claim 15 (Original): The bioferrograph of claim 14 wherein the sensor portion comprises at least one impedance-type sensor.

Claim 16 (Original): The system of claim 15 wherein the impedance-type sensor comprises at least two electrodes for sensing contact with a particle.

Claim 17 (Original): The system of claim 14 wherein the sensor portion comprises at least one resonant-type sensor.

Claim 18 (Original): The system of claim 17 wherein the resonant-sensor comprises at least one resonating material for sensing contact with a particle.

Claim 19 (Original): The system of claim 14 wherein the sensor portion comprises at least one magnetoresistive sensor.

Claim 20 (Original): The system of claim 19 wherein the magnetoresistive sensor comprises at least one sensing section having first and second electrodes and a magnetoresistive material therebetween.

Claims 21-33 (Cancelled)

Claim 34 (Original): A particle separation system having a bioferrograph, said bioferrograph comprising:

- (a) a light source;
- (b) a silicon substrate having a topside and backside;

(c) said topside comprising a sensor portion for sensing the presence of at least one immunofluorescently labeled particle;

(d) the backside comprising a magnetic portion having at least two pole pieces separated by a gap; and

wherein said light source emits light for exciting said at least one immunofluorescently labeled particle and said sensor portion detects the luminosity of said at least one immunofluorescently labeled particle.

Claim 35 (Original): The system of claim 34 wherein said light source comprises a light emitter and at least one optical fiber for directed light towards said sensor portion.

Claim 36 (Original): The system of claim 34 further comprises a computerized quantification system for correlating the detected luminosity with a quantity of particles.

Claim 37 (New): The system of claim 34, the particle separation system further comprising a magnetic structure comprising:

a first pole piece structure;

a second pole piece structure;

a first gap between the first and second pole piece structures; and

the first and second pole piece structures each comprising a plurality of discrete pole pieces and a plurality of secondary gaps disposed between the discrete pole pieces; and each discrete pole piece comprising an orthogonal geometry.

Claim 38 (New): The system of claim 37 wherein the plurality of discrete pole pieces comprise at least a first and a second orthogonal geometry.

Claim 39 (New): The system of claim 37 wherein the plurality of discrete pole pieces comprise a common length dimension.

Claim 40 (New): The system of claim 37 wherein the plurality of discrete pole pieces comprises a common height dimension.

Claim 41 (New): The system of claim 37 wherein the plurality of discrete pole pieces and the plurality of secondary gaps are configured to generate a substantially uniform magnetic field in the first gap.

Claim 42 (New): The system of claim 37 wherein the plurality of discrete pole pieces and the plurality of secondary gaps are configured to approximate the magnetic field generated by a magnetic pole piece having a hyperbolic surface.

Claim 43 (New): The system of claim 34, the particle separation system further comprising a first pole piece structure having a substantially hyperbolic surface formed from plurality of perpendicular edges.

Claim 44 (New): The system of claim 43, further comprising:

a second pole piece structure having a substantially hyperbolic surface formed from plurality of perpendicular edges; and

a first gap between the first and second pole piece structures.

Claim 45 (New): A bioferrograph for identifying magnetically susceptible particles, the bioferrograph comprising:
a semi-conductor substrate comprising a fluid outlet;

at least one magnetic portion disposed in physical communication with the semi-conductor substrate as to magnetically manipulate the magnetically susceptible particles into a collection area; and

at least one sensor portion, in physical communication with the fluid outlet at the collection area, that detects the presence of the magnetically susceptible particles.

Claim 46 (New): The bioferrograph of claim 45 wherein the at least one sensor portion comprises at least one impedance-type sensor.

Claim 47 (New): The bioferrograph of claim 46 wherein the impedance-type sensor comprises at least two electrodes in physical communication with the fluid outlet.

Claim 48 (New): The bioferrograph of claim 45 wherein the sensor portion comprises at least one resonant-type sensor.

Claim 49 (New): The bioferrograph of claim 48 wherein the resonant-sensor comprises at least one resonating unit in physical communication with the flow outlet and an external driving circuit that drives the resonating unit to resonate at a characteristic frequency.

Claim 50 (New): The bioferrograph of claim 45 wherein the sensor portion comprises at least one magnetoresistive sensor.

Claim 51 (New): The bioferrograph of claim 50 wherein the magnetoresistive sensor comprises at least one sensing section having first and second electrodes and a magnetoresistive material therebetween.

Claim 52 (New): The bioferrograph of claim 45 wherein the at least one magnetic portion comprises two magnetic pole pieces having an interpolar gap, the at least one sensor portion being disposed within the interpolar gap.

Claim 53 (New): The bioferrograph of claim 45 wherein the flow outlet is a first flow outlet of a plurality of flow outlets, the at least one magnetic portion being arranged to provide an associated collection area within each of the plurality of flow outlets.

Claim 54 (New): The bioferrograph of claim 53 wherein the plurality of flow outlets are arranged to run along mutually parallel paths and the at least one magnetic portion comprises two magnetic pole pieces, extended across the plurality of parallel paths as to magnetically manipulate magnetically susceptible particles within each of the plurality of flow outlets.

Claim 55 (New): A bioferrograph for identifying magnetically susceptible, immunofluorescently labeled particles:
a semi-conductor substrate comprising a fluid outlet, the fluid outlet having at least one wall that is transparent to a light of a predetermined wavelength;
at least one magnetic portion disposed in physical communication with the semi-conductor substrate as to magnetically manipulate the magnetically susceptible particles into a collection area;

at least one photosensitive sensor portion, in physical communication with the fluid outlet at the collection area; and
a light source that emits light of the predetermined wavelength to excite the one immunofluorescently labeled particles.

Claim 56 (New): The bioferrograph of claim 55 wherein the photosensitive sensor is a photodiode.

Claim 57 (New): The bioferrograph of claim 55 wherein the at least one magnetic portion comprises two magnetic pole pieces having an interpolar gap, the at least one photosensitive sensor portion being disposed within the interpolar gap.

Claim 58 (New): The bioferrograph of claim 55 wherein the flow outlet is a first flow outlet of a plurality of flow outlets, the at least one magnetic portion being arranged to provide an associated collection area within each of the plurality of flow outlets.

Claim 59 (New): The bioferrograph of claim 55 wherein the plurality of flow outlets are arranged to run along mutually parallel paths and the at least one magnetic portion comprises two magnetic pole pieces, extended across the plurality of parallel paths as to magnetically manipulate magnetically susceptible particles within each of the plurality of flow outlets.

Claim 60 (New): The bioferrograph of claim 55 wherein said light source comprises a light emitter and at least one optical fiber for directed light towards said sensor portion.

Claim 61 (New): The bioferrograph of claim 55 further comprising a computerized quantification system for correlating the detected luminosity with a quantity of particles.